SwitchX 36-Port QSFP FDR InfiniBand System User Manual

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SwitchX FDR InfiniBand Switch User Manual

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Revision History

Table 1 - Revision History Table

Date	Revision	Description
July 2011	1.1	Changes reset button section, removed reference to paper clip.
July 2011	1.0	Initial Release

About this Manual

This manual describes the installation and basic use of the Mellanox switch, which is based on the SwitchX IB switch device.

Intended Audience

This manual is intended for users and system administrators responsible for installing and setting up the switch platforms listed above.

The manual assumes familiarity with the InfiniBand® Architecture Specification and .

Related Documentation

Additional Documentation available from Mellanox:

Table 2 - Reference Documents

Document Name	Description
InfiniBand Architecture Specification, Vol. 1, Release 1.2.1	The InfiniBand Architecture Specification that is provided by IBTA
Switch Hardware Installation Guide	Each Mellanox Technologies' switch platform is shipped with an *Installation Guide* document that contains instructions for Installation in a rack and initialization of the switch platform.
Mellanox Firmware Tools (MFT)User's Manual	The MFT (Mellanox Firmware Tools) package is a set of firmware tools. The manual supplied with this package provides an overview of the firmware, its installation and replacement. The MFT can be downloaded with its documentation, according to the operating system, at: http://www.mellanox.com > Support > Download Firmware Tools
Unified Fabric Manager™ (UFM™)	The user manual can be downloaded together with the software package upon license purchase.
Mellanox MLNX-OS SwitchX Software User Manual	This document contains information regarding configuring and managing Mellanox Technologies' SwitchX Switch Platforms.
MLNX-OS Software WebUI User's Manual	WebUI user's manual for MLNX-OS
MLNX-OS Software Command Reference Guide	Command Reference Guide for MLNX-OS listing all of the commands available through MLNX-OS with explanations and examples.
MLNX-OS Software Configuration Guide	Configuration Guide for MLNX-OS displaying different configuration scenarios.

All of these documents can be found on the Mellanox Website. They are available either through the product pages or through the support page with a login and password.

Conventions

Throughout this manual, the name SX60XX and the term switch are used to describe the 36-port QSFP 56Gb/s InfiniBand Switch, unless explicitly indicated otherwise.

The following pictures are used throughout this document to indicate information that is important to the user.

This symbol makes recommendations to the user.

This symbol indicates information that is helpful to the user.

This symbol indicates a situation that can potentially cause damage to hardware or software.

BEWARE! This symbol indicates a situation that can potentially cause personal injury or damage to hardware or software.

Mellanox Part Numbering Legend

Place	Field	Decoder
M		Mellanox Technologies
SX	System Type	SwitchX Switch
PR	Data Transfer Protocol	60 = InfiniBand
FF	Management Capabilities	25 = 36 Ports externally managed 36 = 36 Ports managed (internally)
C	Data Rate	F = FDR, T = FDR10, Q = QDR, D = DDR
-	Separator	
P	# Power Supplies	0=0, 1=1, 2=2....
M	Depth of the Unit	S = standard depth, B = short depth
Y	Air Flow direction	R= Connector side to PSU side airflow F= PSU side to Connector side airflow
X	RoHS	C=RoHS5, R=RoHS6

1 Overview

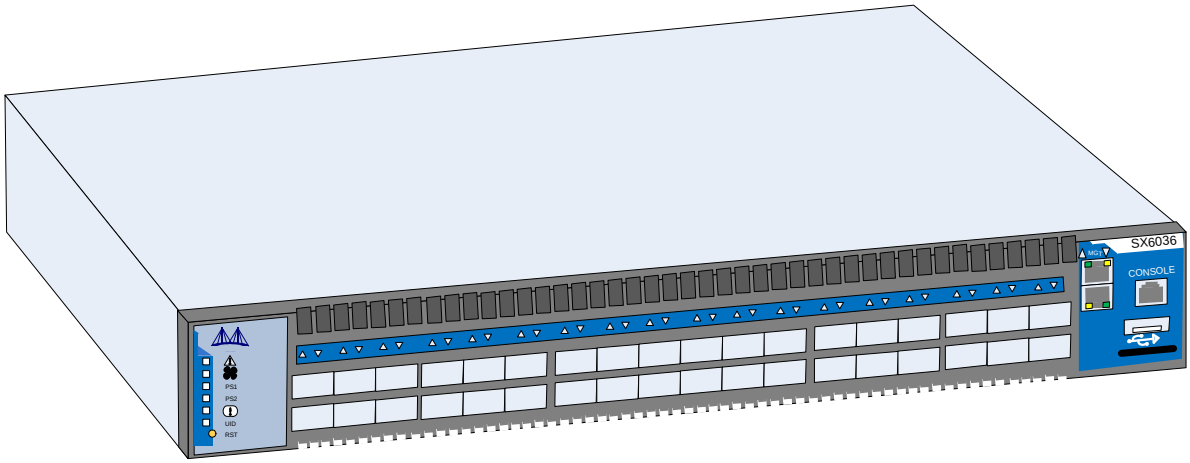
Mellanox SX60XX 4.032 Tb/s switch systems provide the highest performing fabric solution by delivering high bandwidth and low latency to Enterprise Data Centers (EDC), High-Performance Computing (HPC) and Embedded environments. Networks built with SX60XX systems can carry converged traffic with the combination of assured bandwidth and granular quality of service. Built with Mellanox's 5th generation switch device (1st Generation SwitchX VPI switch device), SX60XX systems provide up to 56Gb/s full bidirectional bandwidth per port. With FDR ports, these systems are among the fastest switching systems available. These stand-alone switches are an ideal choice for top-of-rack leaf connectivity or for building small to large size clusters.

The switch comes pre-installed with all necessary firmware and is configured for standard operation within an InfiniBand fabric. This switch requires an InfiniBand compliant Subnet Manager running from one of the hosts or Fabric Management software running on the switch. All that is required for normal operation is to follow the usual precautions for installation and to connect the switch to the adapter cards. Once an unmanaged switch is connected, the Subnet Management software automatically configures and begins utilizing the switch. Managed switches need initial configuration before they will start working.

It is recommended that the Mellanox OpenFabrics software package be installed on all nodes connected to the SX60XX switch. The software package provides a subnet manager and network management tools as well as connectivity software for servers and storage, and is available on the Mellanox web site. See Section 3 on page 15 for more information.

Installation, hot-swapping components and hardware maintenance is covered in "Basic Operation and Installation" on page 16.

Figure 1: Connector Side View of the Switch



1.1 Features

1.1.1 Full Feature List

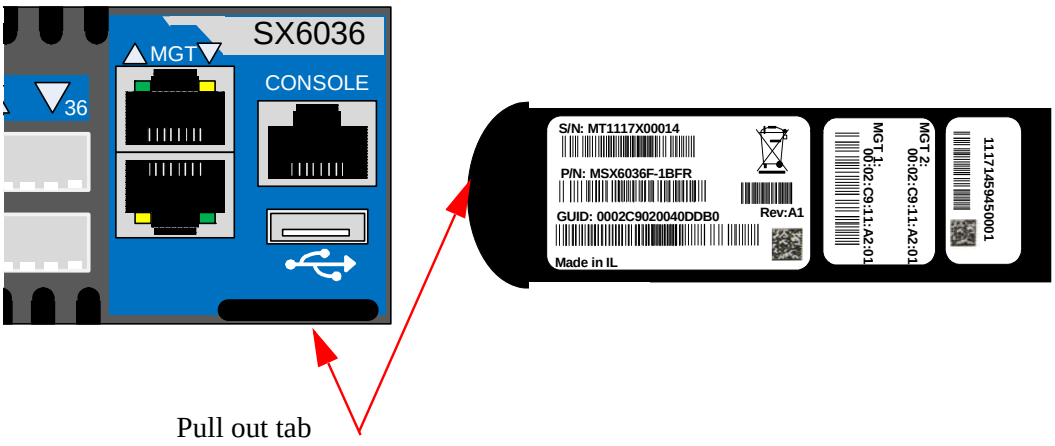
- 36 FDR (56Gb/s) ports in a 1U switch
- IBTA 1.3 and 1.21 compliant
- SDR/DDR/QDR/FDR10/FDR link speed
- Congestion control
- Adaptive routing
- Port mirroring
- FDR10 supports 20% more bandwidth over QDR using the same cables/connectors**
- Up to 8 multiple switch partitions*
- Flexible combinations of FDR and Gateway ports*

* This feature will be available to customers in the near future.
**FDR/FDR10 supports Forward Error Correction (FEC)

1.2 Serial Number and Product Version Information

The Serial number and GUID for the switch and the MAC for the Management PC are found on the pull out tab below the USB interface connection.

Figure 2: Pull Out Tab



2 FDR

Mellanox SX60XX switch systems supports FDR, a pre-standard InfiniBand data rate, where each lane of a 4X port runs a bit rate of 14.0625Gb/s with a 64b/66b encoding, resulting in an effective bandwidth of 54.54Gb/s. The FDR physical layer is an IBTA specified physical layer using advanced block types, deskew mechanism and framing rules for suporting higher speeds and increased reliability.

SX60XX switches also supports FDR10, a non-standard InfiniBand data rate, where each lane of a 4X port runs a bit rate of 10.3125Gb/s with a 64b/66b encoding, resulting in an effective bandwidth of 40Gb/s.

FDR10 supports 20% more bandwidth over QDR using the same QSFP cables/connectors.

Both FDR and FDR10 supports Forward Error Correction (FEC), as described in IEEE 802.3ap chapter 74.

FDR and FDR10 are only guaranteed to work with approved Mellanox Cables.

FDR10 is only guaranteed to work with approved Mellanox ConnectX-3 adapters.

3 Internally Managed Vs. Externally Managed

The following table shows which switches come with a management CPU and which do not.

Externally Managed (Unmanaged) switches are plug and play out of the box. All switches come with the latest firmware burned on the flash. Updating the firmware stack for the unmanaged switches is done in-band only. When a new firmware release is available (e-mail notification) you can upgrade the device through a link to the Mellanox web-page firmware download site.

All internally managed switches have internal chassis management and can support IB fabric of up to 648 nodes. Internally managed switches need an initial configuration before they will start working.

Table 3 - Switch Management

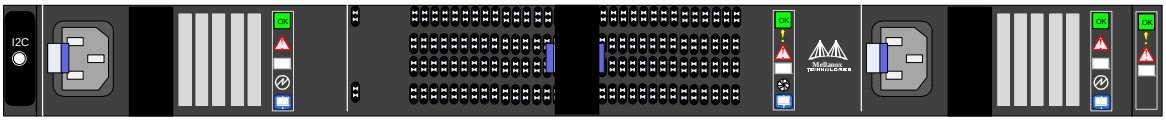
Family	Managed/ Unmanaged	Management Connections
SX6025	Externally Managed (Unmanaged)	Plug and Play All firmware updates should be done in-band using Mellanox firmware management tools. I2C port access using MTUSB-1 device is required for firmware updates if in-band burning is not possible.
SX6036	Internally Managed	RS232 cable DB9 to RJ45 included in the box to connect to host PC for initial configuration of the switch. After initial configuration, the switch can be managed through the Ethernet port using a remote connection.

4 Basic Operation and Installation

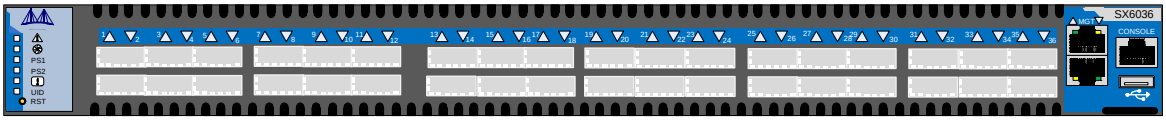
4.1 Switch Platform Hardware Overview

Figure 3 shows the power side panel and connector side panel views of the managed switch. The figure shows port configurations for the switch systems, the dual hot-swap power supplies, and hot-swap fan module, 2 – Ethernet RJ45 connectors for management, 1 – RJ45 connector for connecting to a host PC, 1 – USB connector, and various status LEDs. Unmanaged switches only have a single I2C RJ45 connector.

Figure 3: QSFP Switch System Power and Connector Side Panels



Power Side Panel



Connector Side Panel

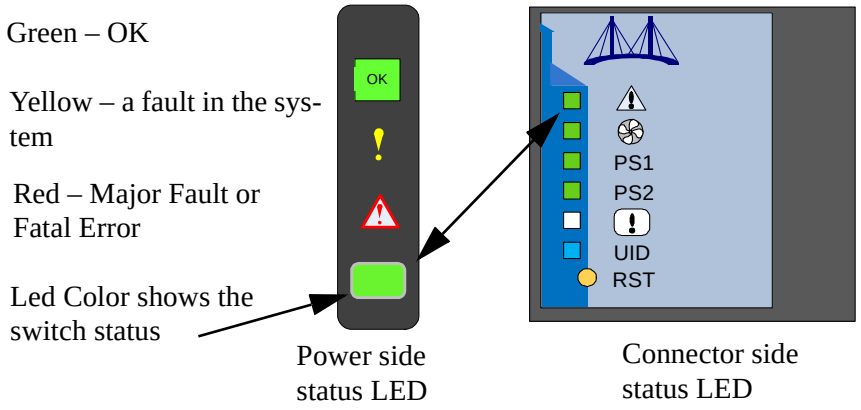
All connectivity except for power cords is via the connector side panel. All connectors can support active cables.

4.1.1 Status LEDs

4.1.1.1 System Status Indicators

The System Status Indicators(⚠) are located to the left of the connectors on the connector side panel, and on the power side at the far right. Both of these LEDs give identical information.

Figure 4: System Status Indicators



The system status indicators should display as follows:

- When the switch is plugged in, within five minutes the STATUS LED should light up green.
- The PSU1 LED for the plugged in PSU should light up green.
- The PSU2 LED for the second PSU should light up green only if a second PSU is installed in the switch for redundancy and Hot-Swap ability and it is connected to a power source. If two PSUs are installed and only one PSU is connected to a power supply the second PSU2 LED will be red. If only one PSU is installed in the switch, the PSU2 LED will be off.

As long as there is power to the switch (one PSU is connected), and the switch is booted up and running, the status LED should be green.

- The FAN LED should light up green.

If the STATUS LED shows red after five minutes, unplug the switch and call your Mellanox representative for assistance.

If the FAN LED shows red, troubleshoot the fan module. See See “Troubleshooting” on page 48.

If the switch shuts down due to over temperature, unplug the switch, wait 5 minutes and replug in the switch. For more information See “Troubleshooting” on page 48.

If the PSU LEDs are not green, this indicates a problem with the power supplies. The switch is operational only if at least one of the PSU LEDs is green.

Figure 5: Power, Fan, and System LEDs

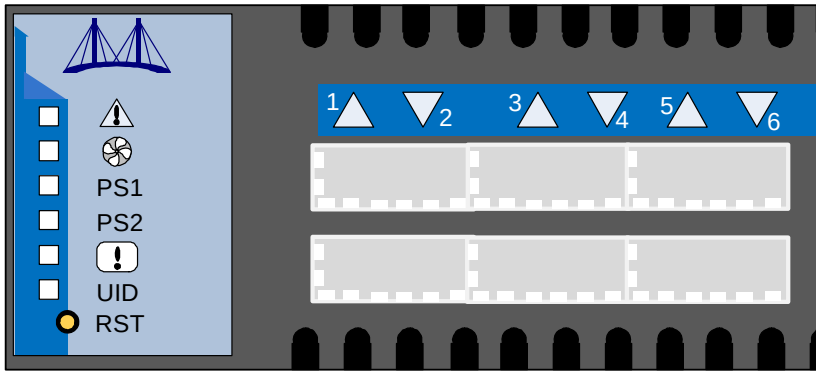


Table 4 - System Status LED Configurations

LED Configuration	STATUS/ System Health LED
Green	OK – The system is up and running.
Flashing Green	The system is booting up.
Yellow	Error – A fault in the system, most likely the firmware did not BOOT properly.
Red	Major Error – Possible damage can result to the switch. Turn off immediately. e.g. bad firmware, can't boot, overheated
Off	Off – The system has no power.

4.1.1.2 Port Connector LED Indicators

Above the ports are two LEDs one for the upper port ▲ and one for the lower port ▼ . The following table shows the port status according to the LED indication.

Figure 6: Port LEDs

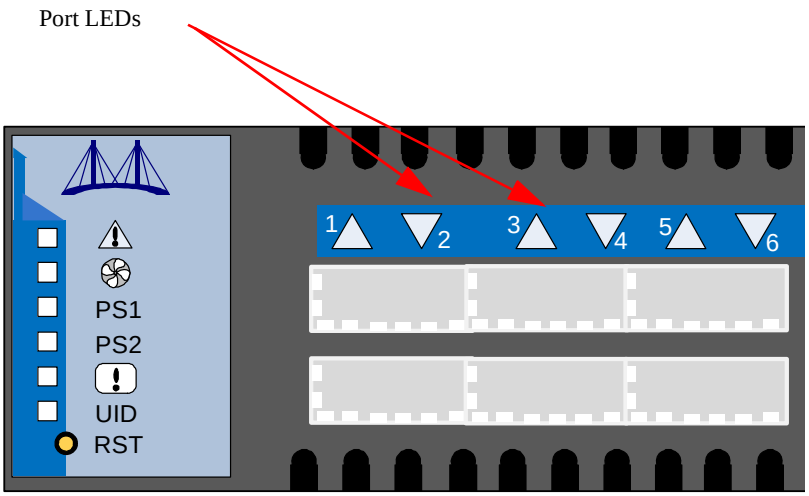


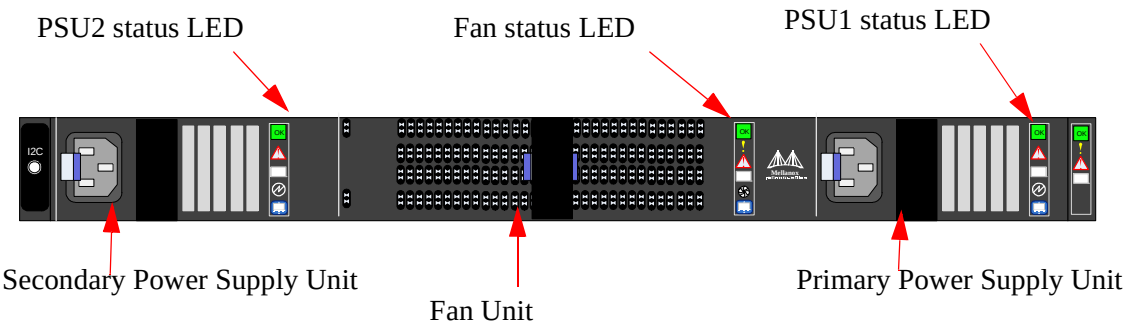
Table 5 - Connector Physical and Logical Link Indications

LED Status	LED Description
Off	No power to the port
Solid Green	Logical link up
Flashing Green	Data activity flashing speed ≈ data transfer speed
Orange	Physical link up
Flashing Orange	A problem with the physical link. Usually the SM is down or not enabling the port.

4.1.1.3 Power Supply Status Indicators

The SX60XX switch is available with one or two factory installed Power Supply Units. For switches with only one unit installed, a second Power Supply Unit can be added to support hot-swap ability and to add redundancy. See Section E, “Replacement Parts Ordering Numbers,” on page 63 for ordering part numbers.

Figure 7: Power Side Panel



The primary power supply unit (PSU1) is located on the right side of the power side panel, with PSU2 on the left side. Each PSU has a single 2 color LED on the right side of the PSU, that indicates the internal status of the unit.

Figure 8: PSU Status LEDs

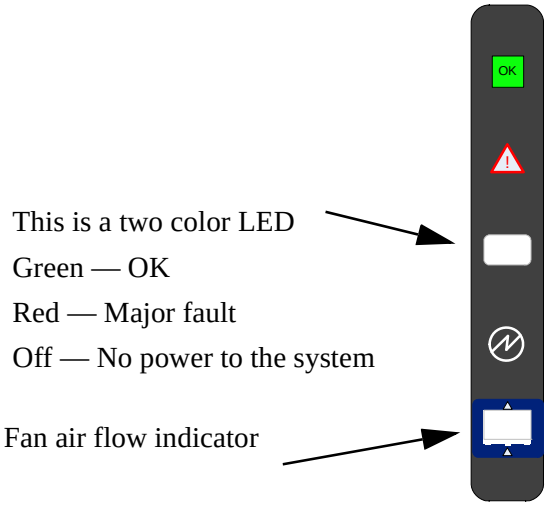


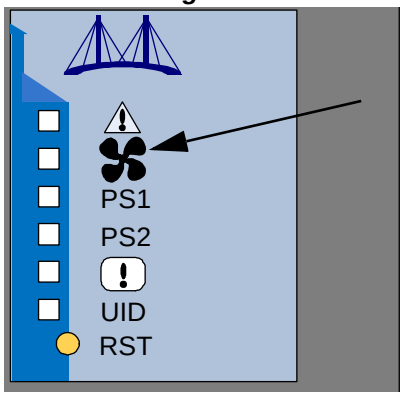
Table 6 - PSU Status LED Configurations

LED Color	Status
Green	OK – The Power supply is delivering the correct voltage – 12VDC
Red	Error – The PSU is not operational
Off	Off – There is no power to the system (neither PSU is receiving power). If one PSU is showing green and the second PSU is unplugged it will show a red indication.

4.1.1.4 Fan Status Indicators

The indicator is located to the left of the connectors on the connector side panel.

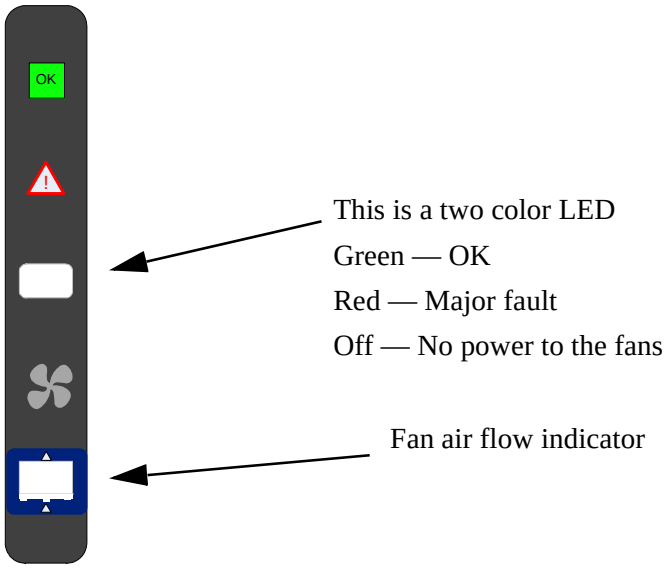
Figure 9: Fan Status LED Connector Side



This is a two color LED
Green — OK
Red — Major fault
Off — No power to the fans

The LED indicator on the Fan Module is on the right side of the module.

Figure 10: Fan Status LED Power side



The following fan status conditions are possible:

Table 7 - Fan Status LED Configurations

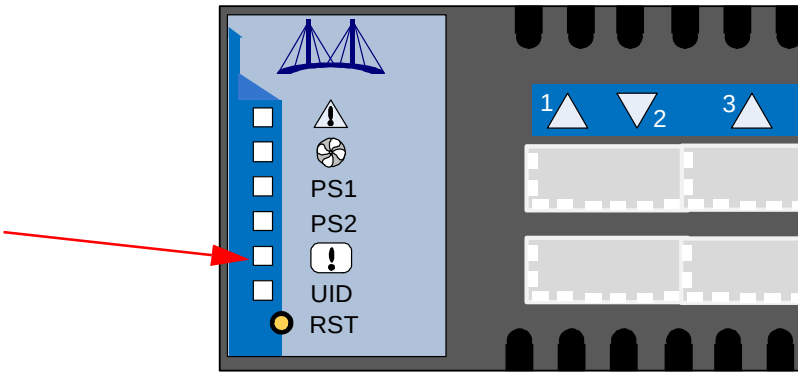
LED Configuration	FAN LED
Green	OK – The system is up and running
Red	Error – One or more fans is not operating properly. The system should be powered down and troubleshoot the fan module
Off	Off – The fan unit is not receiving any power. Check that the fan unit is properly and completely inserted

All fans must be operating while the power supply is plugged in.

If the switch shuts down due to over temperature, unplug the switch, wait 5 minutes and replug in the switch. For more information See “Troubleshooting” on page 48

4.1.1.5 Bad Port LED

Figure 11: Bad Port LED



The Bad Port indicator is located on the left side of the connector side panel of the unit. The following Bad Port conditions are possible:

Table 8 - Bad Port LED Configurations

LED Configuration	Description
Off	OK – All ports are up and running
Flashing Orange	Error –One or possibly more ports has just received a symbol error

This LED shows symbol errors. Possible causes for this are:

- bad cable
- bad connection
- bad connector

This LED lights up when one or more ports is receiving a symbol error. The LED immediately goes off until the next symbol error is received.

4.1.1.6 UID LED Switch Identifier

The UID LED is a debug feature that will become available to customers in the near future. For details please contact Mellanox Technologies support.

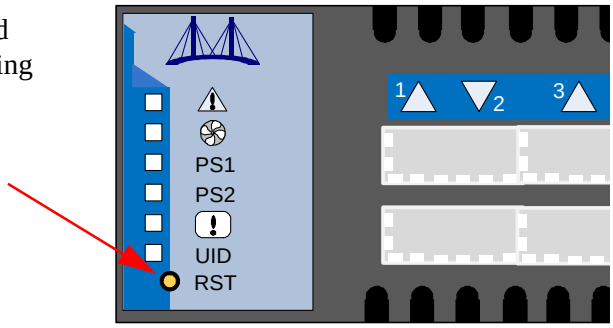
4.1.2 Reset Button

On the connector side panel under the system LEDs is a reset button. This reset button requires a tool to be pressed.

DO NOT use a sharp pointed object such as needle or push pin for pressing the Reset button. Sharp objects can cause damage, use a flat object to push the reset button.

Figure 12: Reset Button

Press the reset button to reset the main and management CPUs and to delete the existing password.



This button resets both the CPU of the switch device and the CPU of the management module. It thereby resets all of the ports by bringing them down and powering them up when the button is pushed. A quick push of this button performs this reset. When the button is held down for 15 seconds the switch is reset and the password is deleted. You will then be able to enter without a password and make a new password for the user admin.

In the externally managed switch the reset button resets the CPU of the switch device.

4.2 Air Flow

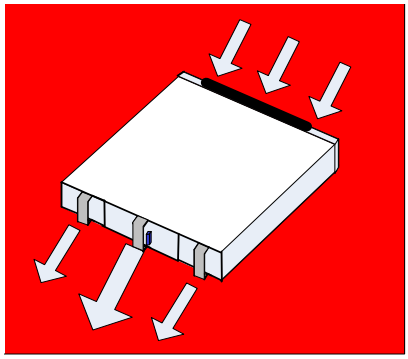
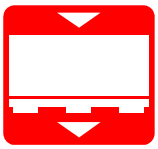
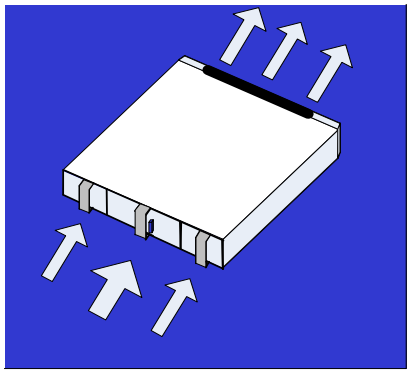
These switches can come with two air flow patterns. The two patterns are:

- Connector side inlet to power side outlet
- Power side inlet to connector side outlet

The air flow is specified in the product model number. See “Mellanox Part Numbering Legend” on page 10. On the PSU and fan modules the air flow direction can be seen on the power side panel.

All PSUs must have the same air flow as the fan module.

Table 9 - Air Flow Direction

Direction	Label	OPN Designation	Description
		R	Connector side inlet to power side outlet
		F	Power side inlet to connector side outlet

4.3 QSFP Cable Power Budget Classification

All SwitchX QSFP switches are designed for active cables with a max power per module of 2W. Typical power per port is 1.5W.

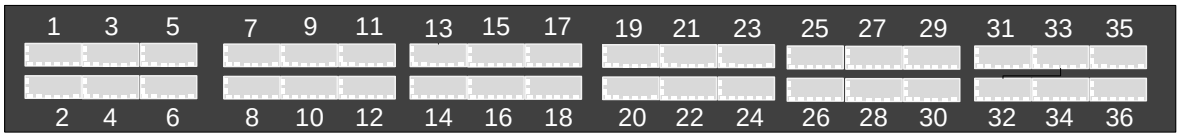
4.4 Interfaces

4.4.1 Port Connector Interfaces

4.4.1.1 36 Port Switches

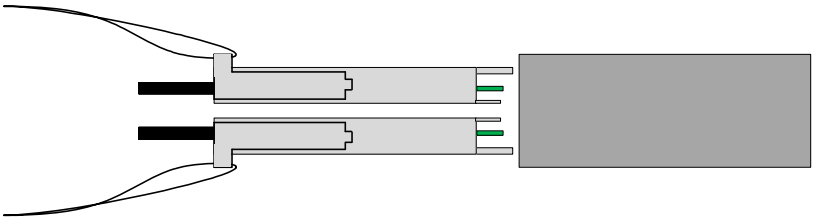
The Connector side of the switch has 36 QSFP ports. These are placed in two rows, 18 ports to a row. The ports are labelled as shown in Figure 13. The bottom row ports are flipped from the top row. See Figure 14 for bottom row - top row port orientation.

Figure 13: Port Numbering



4.4.1.2 Top and Bottom Orientation

Figure 14: Top and Bottom Ports



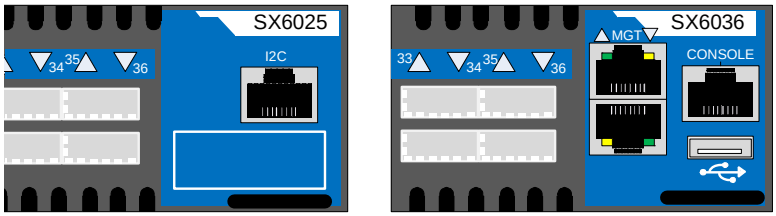
4.4.2 Management and Firmware Updating Interfaces

There are four interfaces to connect to the SX6036:

- 2 X 100M/1Gb Ethernet connectors labelled “MGT”.
- 1 USB port that is labelled . This interface can be used to update software or firmware.
- 1 connector that is labelled “CONSOLE”. Use this connector to connect to the host PC.

There is one I2C interface to connect to the SwitchX SX6025.

Figure 15: Management Interfaces



Externally Managed Internally Managed

4.4.2.1 RJ-45 Connector (CONSOLE) Internally Managed Switches only

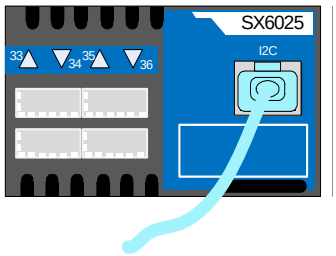
The port labelled “CONSOLE” is for a local host connection to the management module. This is used the first time the switch is connected. A harness is included in the package to connect to a DB9 connection on a host PC. Connecting to a local host PC and following the instructions in the Installation Guide, “Configuring the Switch for the First Time”, must be done before any remote

management is available. For the Socket pinout see “RJ45 CONSOLE and Ethernet Interfaces” on page 62.

This connector is not found in externally managed switches.

4.4.2.2 RJ-45 Connector (I2C) Externally Managed Switches only

Figure 16: RJ45 I2C Connector



All firmware updates should be done in-band using Mellanox Firmware Management Tools.

This interface is for Debug and Troubleshooting only. This interface is for FAEs and advanced users only.

You will need to order an MTUSB-1 USB to I2C adapter to make use of the I2C interface. An HAR 000022 harness is included in the MTUSB-1 package to connect the switch for updating firmware. The I2C connection provides access to Flash and EEPROMs. This connection allows access to the switch for updating firmware. See Section 5.5.

4.4.2.3 RJ-45 Ethernet Connector (MGT) Internally Managed Switches

The Ethernet connection labelled “MGT” provides access for remote management. The switch can be connected to any Ethernet port.

These connector(s) are not found in unmanaged (externally managed) switches.

Each Ethernet connector gets connected to Ethernet switches. These switches must be configured to 100M/1G auto-negotiation.

The unmanaged switches are Plug and Play and all firmware updates should be done in-band. The I2C connection should only be used if the firmware image was corrupted to the point that the regular firmware tools cannot successfully reburn the correct image.

4.4.2.4 USB interface

The USB interface can be used to update the MLNX-OS™ Web User Interface (WebUI) or MLNX-OS™ Command Line Interface (CLI).

There is a single USB connector. This connector can be used to install software and or firmware upgrades using a memory device that has a USB connector. This connector is USB 2.0 compliant.

The USB connector is not found on unmanaged (externally managed) switches.

4.4.2.5 I2C Interface On Managed Switches

There is an I2C connector on the far left of the power side of the switch. **This interface is for Debug and Troubleshooting only.** This connector can be used to install firmware upgrades, should the firmware image be damaged and cannot be upgraded through a host PC or remotely. This interface is for support personnel and advanced users only.

4.5 Switch Platform Installation and Operation

Installation and initialization of the switch platform are straightforward processes, requiring attention to the normal mechanical, power, and thermal precautions for rack-mounted equipment.

The unmanaged switch platform does not require any programming or configuration to operate as a basic InfiniBand switch and includes all of the necessary functionality to operate with external standard InfiniBand Subnet Management software.

The managed switch platform requires initial configuration to operate as an InfiniBand switch. All internally managed switches come with an internal PPC based management board. This board allows for internally managing the switch through a host PC or remotely through the Ethernet.

4.5.1 Installation Safety Warnings

For Safety Warnings in French see Section F,“Avertissements de sécurité d’installation (French),” on page 64, for German see Section G,“Installation - Sicherheitshinweise (German),” on page 66,

and for Spanish see Section H,“Advertencias de seguridad para la instalación (Spanish),” on page 68.

For special regulations regarding Finland, Sweden, Denmark, and Norway see Section ,“,” on page 70.

1. **Installation Instructions**

Read all installation instructions before connecting the equipment to the power source.

2. **Over-temperature**

This equipment should not be operated in an area with an ambient temperature exceeding the maximum recommended: 45°C (113°F). Moreover, to guarantee proper air flow, allow at least 8cm (3 inches) of clearance around the ventilation openings.

3. **Stacking the Chassis**

The chassis should not be stacked on any other equipment. If the chassis falls, it can cause bodily injury and equipment damage.

4. **Redundant Power Supply Connection - Electrical Hazard**

This product includes a blank cover over the space for the redundant power supply. Do not operate the product if the blank cover is not securely fastened or if it is removed.

5. **During Lightning - Electrical Hazard**

During periods of lightning activity, do not work on the equipment or connect or disconnect cables.

6. **Copper Cable Connecting/Disconnecting**

Copper cables are heavy and not flexible, as such they should be carefully attached to or detached from the connectors. Refer to the cable manufacturer for special warnings and instructions.

7. Rack Mounting and Servicing

When this product is mounted or serviced in a rack, special precautions must be taken to ensure that the system remains stable. In general you should fill the rack with equipment starting from the bottom to the top.

8. Equipment Installation

This equipment should be installed, replaced, or serviced only by trained and qualified personnel.

9. Equipment Disposal

Disposal of this equipment should be in accordance to all national laws and regulations.

10. Local and National Electrical Codes

This equipment should be installed in compliance with local and national electrical codes.

11. Hazardous Radiation Exposure

Caution – Use of controls or adjustment or performance of procedures other than those specified herein may result in hazardous radiation exposure.

CLASS 1 LASER PRODUCT and reference to the most recent laser standards:
IEC 60 825-1:1993 + A1:1997 + A2:2001 and EN 60825-1:1994+A1:1996+ A2:2001

12. UL Approved AC Power Cords

For North American power connection, select a power supply cord that is UL Listed and CSA Certified
3 - conductor, [18 AWG], terminated in a molded on plug cap rated at 125 V, [15 A], with a minimum length of 1.5m [six feet] but no longer than 4.5m

For European connection, select a power supply cord that is internationally harmonized and marked “<HAR>”,
3 - conductor, minimum 0,75 mm2 wire, rated at 300 V, with a PVC insulated jacket. The cord must have a molded on plug cap rated 250 V, 10 A.

4.5.2 Mechanical Installation

The switch platform can be rack mounted and is designed for installation in a standard 19” rack. The power side of the switch includes a hot-swap power supply module, a blank cover for an optional second PSU for redundancy, and a hot-swap fan tray. There are two possible air flow directions. Be sure that the switch air flow direction is compatible with your system, rack, and PSUs. The connector side of the switch has the QSFP ports, system LEDs, and management connection ports.

The switch platform contains auto-sensing 100 - 240 VAC connections for all possible PSUs.

The installer should use a rack capable of supporting the mechanical and environmental characteristics of a fully populated platform.

The rack mounting holes conform to the EIA-310 standard for 19-inch racks. Take precautions to guarantee proper ventilation in order to maintain good airflow at ambient temperature. Cable routing in particular should not impede the air exhaust from the chassis.

4.5.2.1 Installation Kits

There are two Installation kit options. One long and one short. Both the long and the short switches can be mounted using the long rail kit.

Table 10 - Installation Kit According to Rack Size

Kit OPN	Rack Size
MSX60-BKIT	40-60 cm
MSX60-SKIT	60-80 cm

4.6 Package Contents and Installation

Before you install your new SX60XX switch, unpack the system and check to make sure that all the parts have been sent, check this against the parts list below. Check the parts for visible damage that may have occurred during shipping.

The switch comes packed with the following items:

- 1 X – switch
- 1 X – installation kit
- 1 X – power cable for each PSU – Type B 6ft US 125V 10A chord.
  - See “Replacement Parts Ordering Numbers” on page 63 to order power cords for various countries.
  - A single power cord for each power supply unit can be ordered at no extra charge.

- 1 X – Harness
  - HAR000028 – Harness RS232 2M cable – DB9 to RJ45 for SX6036 switches

If anything is damaged or missing, contact your customer representative immediately.

4.6.1 Installing the Switch in the Rack

Tools and Customer Supplied Parts

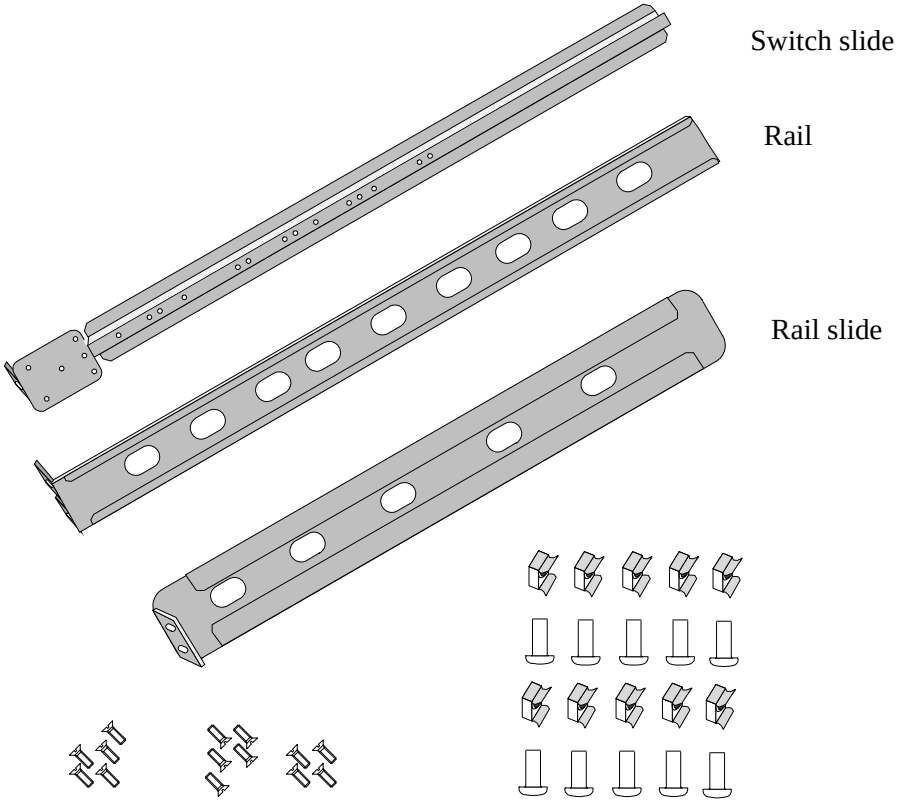
- Phillips Screwdrivers #1 and #2
- ESD strap
- ESD mat
- grounding screw
- grounding wire sufficient to reach a valid ground.

For racks from 60cm to 80cm deep either use the standard depth switches with the long rail kit or the short switches with the long rail kit.

Parts included in the rail kit:

- 2 rails
- 2 rail slides
- 2 switch slides
- 14 recessed flat head screws for the standard switch
- 10 caged nuts
- 10 pan head screws M6

Figure 17: Rack Rail Kit Parts



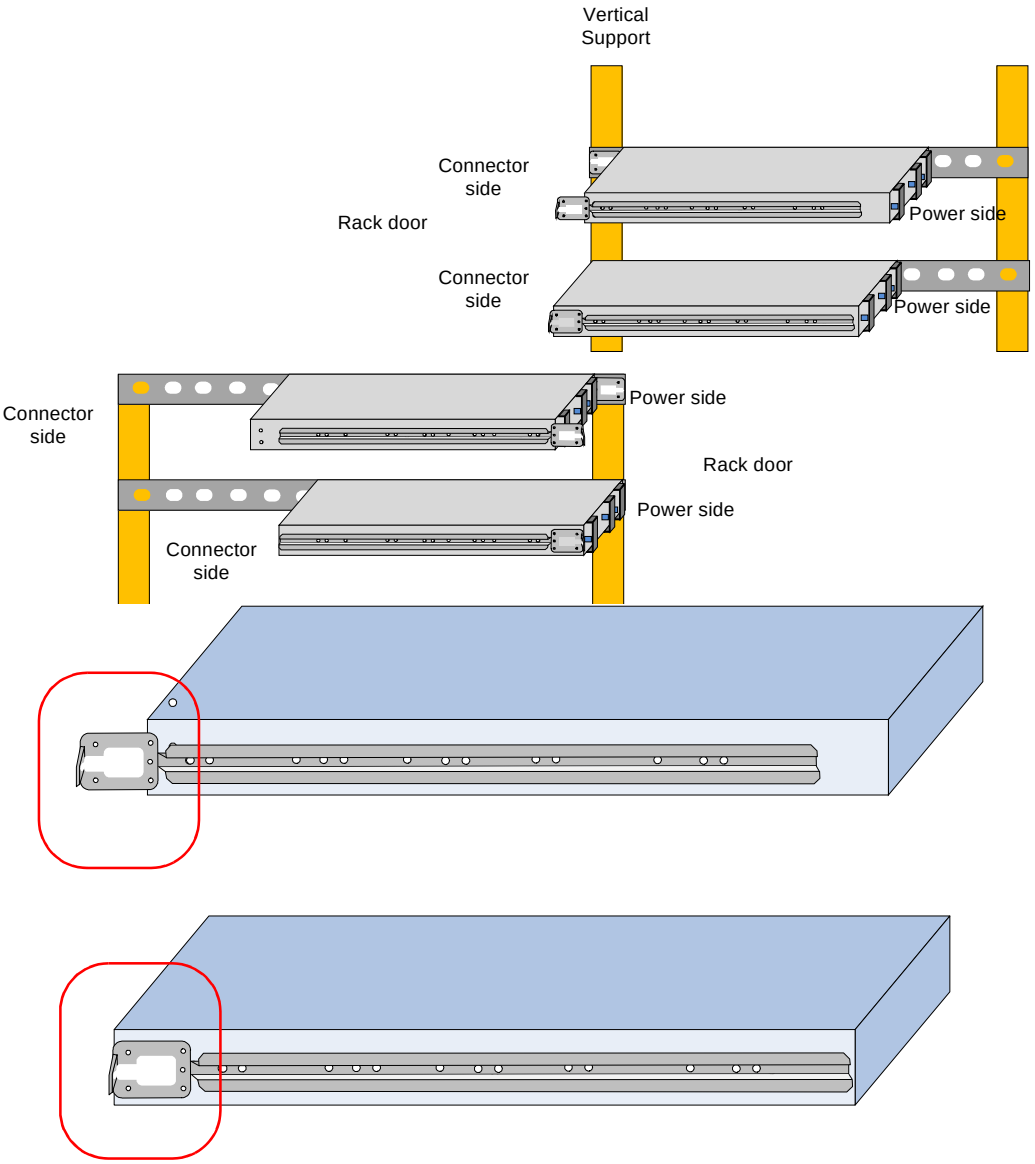
1. Place the ESD mat on the floor where you will be working and put on the ESD strap. Make sure the ESD strap is touching your skin and that the other end is connected to a verified ground.
2. Choose which side of the switch you want even with the rack vertical support. Either the side with the power supply units or the side with the QSFP connectors can be even with one of the vertical rack supports.

Things to consider before choosing where to mount the rails and rail slides.

The distance between the rack and the door can be as little as 4 cm on one side of the rack and as much as 18 cm on the other side of the rack. Keep in mind that there can be as many as 36 cables connected to the switch.

- Do you want the connector side recessed in the rack to allow for a larger cable bending radius? It is possible to recess the connector side by 5cm by optional placement of the switch rails. See Figure 18,“Mounting Options”.
- Will the connector side be recessed past other equipment in the rack and will this be problematic?
- The installation kit allows for a 2” recess of the switch past the vertical support.

Figure 18: Mounting Options

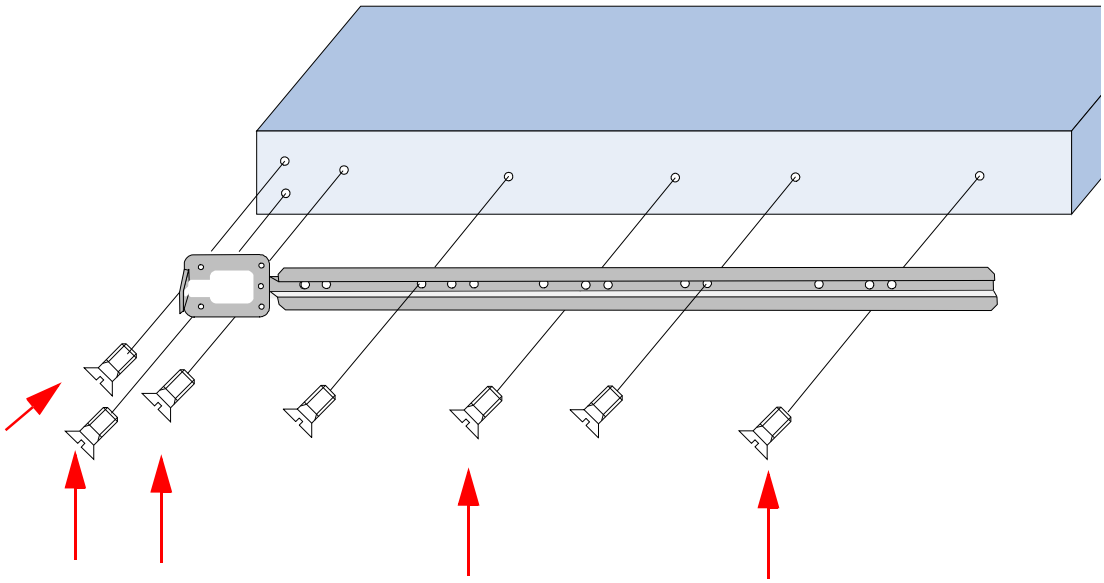


3. Decide which mounting option you want to use.

To use the rail kit to transfer the power cord from the connector side to the power side **go now to "Transferring the Power Cord" on page 58.**

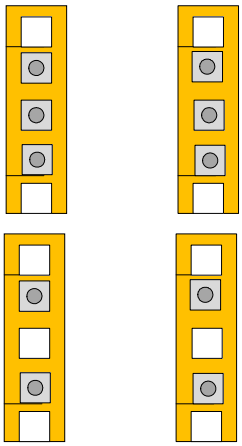
4. Screw the switch slides onto the switch. Use 5 flat head screws for short switches and 7 screws for standard depth switches, to connect each switch slide.

Figure 19: Screwing on the Rail



5 screws per side are needed for the short switch
7 screws per side are needed for the standard switch

Figure 20: Inserting the Caged Nuts

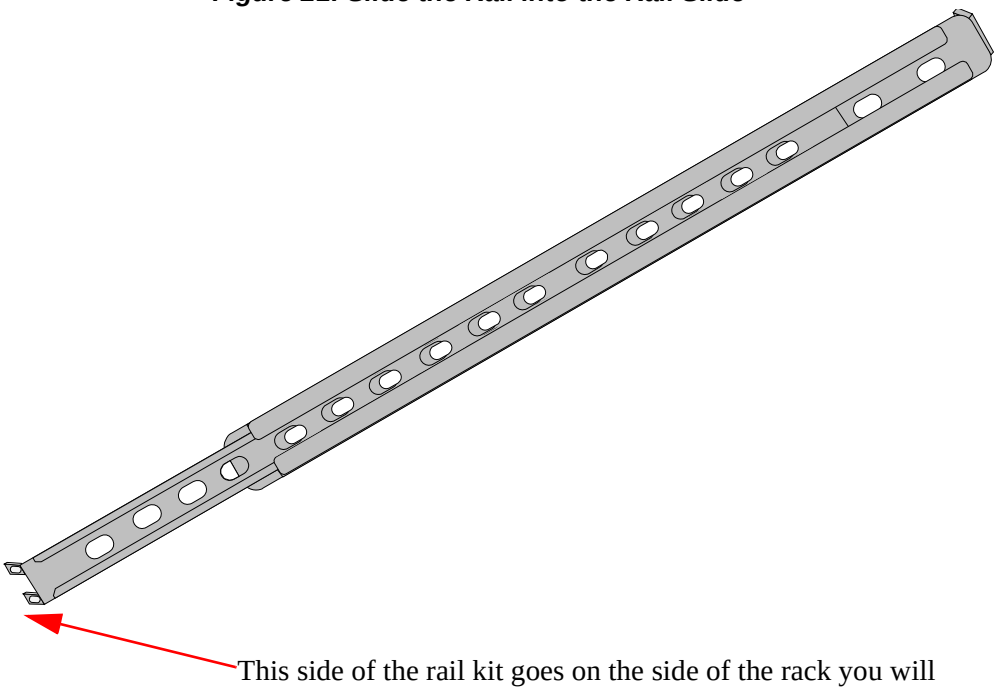


Side you will slide the swich into

Second side

5. Clip 6 caged nuts into the holes in the rack on the side of the rack you will be sliding the switch into. Check that both sides of the switch, power side and connector side, are at the same level in the rack.
6. Clip 4 more caged nuts into the holes on the opposite side of the rack Check that both sides of the switch, left and right, are the same level in the rack.
7. Slide the rail into the rail slide.
8. Using two of the bolts for each corner install the rails and rail slides in the rack. Do not tighten the bolts yet.

Figure 21: Slide the Rail into the Rail Slide


This side of the rail kit goes on the side of the rack you will slide the switch into. This is the same side of the switch that will be next to the vertical support.

9. Slide the switch into the rails.
10. Tighten the bolts to 9.2 Nm or 81.5 pound inches.
11. Put the switch into place and screw the bolts into the nuts. Tighten the bolts to 9.2 Nm or 81.5 pound inches.
12. Ground the switch.
13. Plug in the power cables.
14. Check the Status LEDs and confirm that all of the LEDs show status lights consistent with normal operation.

Warning: Any yellow or red status LEDs are cause for concern and must be dealt with immediately.

It can take up to 5 minutes to boot up, during which time the status LED may indicate red.

15. You can start connecting all of the cables to the switch.

4.6.2 Grounding the Switch

Check to determine if your local or national electrical codes require an external ground to all IT components. If so, connect a ground wire to one of the casing screws and connect the other end to a valid ground. If you choose to not use the ground screw, make sure that the rack is properly

grounded and that there is a valid ground connection between the chassis of the switch and the rack. Test the ground using an Ohm meter.

Some national and/or local codes may require IT components to be bonded and externally grounded (not including the power cord ground). You must follow all national and local codes when installing this equipment.

4.6.3 Power Connections and Initial Power On

The switch platform ships with one or two Power Supply Units. For switches with only one unit installed, a second PSU may be installed at a later time. Each supply has a separate AC receptacle. The input voltage is auto-adjusting for 100 - 240 VAC, 50-60Hz power connections. The power cords should be standard 3-wire AC power cords including a safety ground and rated for 15A or higher.

Caution: The switch platform will automatically power on when AC power is applied. There is no power switch. Check all boards, power supplies, and fan tray modules for proper insertion before plugging in a power cable.

Caution: After inserting a power cable and confirming the green system status LED light is on; make sure that the Fan Status indicator shows green.

If the fan status indicator is not green then unplug the power connection and check that the fan module is inserted properly and that the mating connector of the fan unit is free of any dirt and/or obstacles.

Caution: When turning off the switch, make sure ALL Connector LEDS are off to ensure a powered down status.

Do not hot swap the power supply if your switch has only one power supply. You must power down the system to replace the power supply unit when there is only one PSU in the switch.

Figure 22: Two Power Inlets - Electric Caution Notifications

CAUTION

Risk of electric shock and energy hazard. The two PSUs are independent.

Disconnect all power supplies to ensure a powered down state inside of the switch platform.

ACHTUNG

Gafahr des elektrischen Schocks. Entferrnen des Netzsteckers elnes Netzteils spannungsfrei. Um alle Einhieten spannungsfrei zu machen sind die Netzstecker aller Netzteile zu entfernen

ATTENTION

Risque de choc et de danger e'lectriques. Le de'branchment d'une seule alimentation stabilise'e ne de'branch uniquement qu'un module "Alimentation Stabilise'e". Pour isoler completement le module en cause, Il faut de'brancher toutes les alimentations stabilise'es.

4.6.4 Extracting and Inserting the Power Supply Unit

With both power supplies installed in the redundant configuration, either PSU may be extracted without bringing down the system.

Make sure that the PSU that you are NOT replacing is showing all green, for both the PSU and status indicators.

Power supply units have directional air flows similar to the fan module. The Fan module airflow must coincide with the airflow of all of the PSUs. If the PSU airflow direction is different from the fan module airflow direction the system will shut down.

Figure 23: Power Supply Unit Extraction

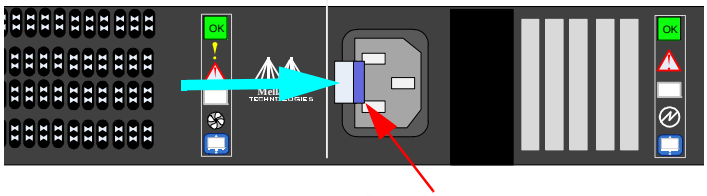
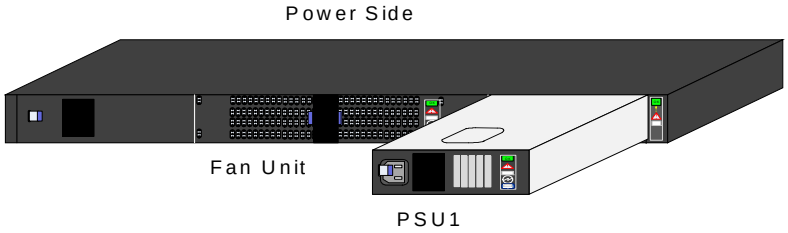


Figure 24: PSU Pulled Out



To extract a PSU:

1. Remove the power cord from the power supply unit.
2. Grasping the handle with your right hand, push the latch release with your thumb while pulling the handle outward. As the PSU unseats, the PSU status indicators will turn off.
3. Remove the PSU.

To insert a PSU:

1. Make sure the mating connector of the new unit is free of any dirt and/or obstacles.

Do not attempt to insert a PSU with a power cord connected to it.

2. Insert the PSU by sliding it into the opening until a slight resistance is felt.
3. Continue pressing the PSU until it seats completely. The latch will snap into place confirming the proper installation.
4. Insert the power cord into the supply connector.
5. Insert the other end of the power cord into an outlet of the correct voltage.

The green PSU indicator should light. If not, repeat the whole procedure to extract the PSU and re-insert it.

4.6.5 Cable Installation

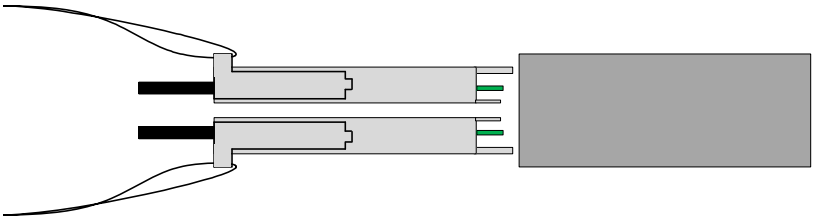
FDR and FDR10 are only guaranteed to work with approved Mellanox Cables.

All cables can be inserted or removed with the unit powered on. To insert a cable, press the connector into the port receptacle until the connector is firmly seated. The GREEN LED indicator, corresponding to each data port, will light when the physical connection is established (that is, when the unit is powered on and a cable is plugged into the port with the other end of the connector plugged into a functioning port). After plugging in a cable, lock the connector using the latch-

ing mechanism particular to the cable vendor. When a logical connection is made the yellow light will come on. When data is being transferred the green light will blink.

Cables in the bottom row should be inserted up side down in relation to the how the cables are inserted in the top row.

Figure 25: Top and Bottom Ports



To remove, disengage the locks and slowly pull the connector away from the port receptacle. Both LED indicators will turn off when the cable is unseated.

Care should be taken not to impede the air exhaust flow through the ventilation holes next to the connector ports. Cable lengths should be used which allow for routing horizontally around to the side of the chassis before bending upward or downward in the rack.

4.6.6 Extracting and Inserting the Fan Unit

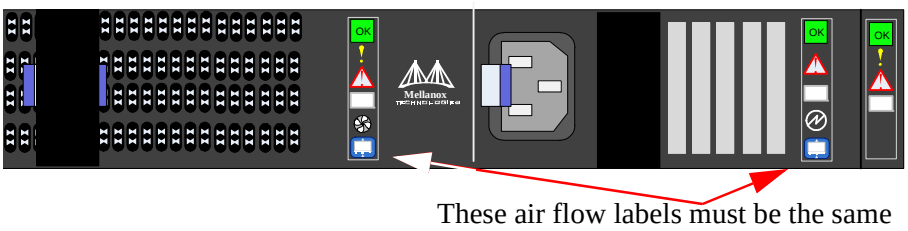
This switch can operate indefinitely with one of the three fans in the fan module inoperable so long as the ambient temperature is below 45° Celsius.

Operation without a fan unit should not exceed two minutes.
During fan hot-swap, if both indicators are OFF then the fan unit is disconnected.

There are two possible air flows for the fan unit. The air flow depends on the switch model. See “Air Flow” on page 23 for an explanation of the model numbers and labels.

Make sure that the fans have the air flow that matches the model number. An air flow opposite to the switch design will cause the switch to operate at a higher (less than optimal) temperature.

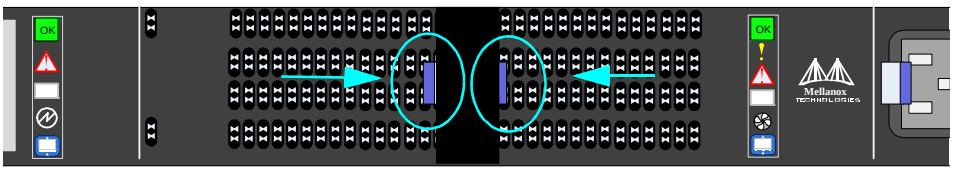
Figure 26: Air Flow Labels



To extract a Fan Unit

1. Using two fingers, push both latch releases towards each other simultaneously while pulling the fan module out of the switch. As the fan unseats, the fan status indicator will turn off.

Figure 27: Fan Module Latches



These two latches must be pushed towards each other at the same time while the module is pulled out.

To insert a FAN Unit:

1. Make sure the mating connector of the new unit is free of any dirt and/or obstacles.
2. Insert the fan unit by sliding it into the opening until slight resistance is felt. Continue pressing the fan unit until it seats completely.

The green fan status indicator should light. If not, extract the fan unit and reinsert it. After two unsuccessful attempts to install the fan unit, power off the switch before attempting any system debug.

4.7 Switch Shut Down Procedure

To shut down the switch run the command:

```
Reload halt [noconfirm]
```

The switch cannot be restarted remotely!
To restart the switch you must physically go to the switch and unplug and replug in the power cord.

4.8 Disassembly of the Switch from the Rack

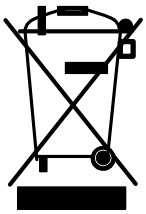
To disassemble the switch from the rack:

1. Unplug and remove all connectors.
2. Unplug all power cords.
3. Remove the ground wire.
4. Unscrew the 2 bolts from the side of the switch with the bracket.

Support the weight of the switch when you remove the screws so that the switch does not fall.

5. Slide the switch from the rack.
6. Remove the rail slides from the rack.
7. Remove the eight caged nuts.

4.9 Disposal



According to the WEEE Directive 2002/96/EC, all waste electrical and electronic equipment (EEE) should be collected separately and not disposed of with regular household waste.

Dispose of this product and all of its parts in a responsible and environmentally friendly way.

Follow the instructions found in the Mellanox Web site at mellanox.com for proper instructions to disassemble and dispose of the Switch according to the WEEE directive.

5 Management and Tools Overview

The switch to be managed either remotely, or Out-of-Band using MLNX-OS.

5.1 Chassis Management Using the MLNX-OS Software

The SX6036 switches come standard with a management software module for chassis management called Mellanox Operating System (MLNX-OS). MLNX-OS is installed on all SwitchX based managed switch systems. MLNX-OS includes a CLI, WebUI, SNMP and chassis management software and IB management software (OpenSM).

The Ethernet ports for remote management connect to Ethernet switches. These switches must be configured to 100M/1G auto-negotiation.

The IB Subnet Manager running on the SX6036 switches supports up to 648 nodes. If the fabric includes more than 648 nodes, you may need to purchase Mellanox's Unified Fabric Manager™ (UFM™) software package.

The managed switch system includes the following software components:

- embedded OS
- chassis manager and system BIST
- SNMP agent, 3rd party tool integration
- GUI
- subnet manager
- remote logging
- SSH/telnet
- secured access in-band and out-band
- IPv4/IPv6 network stack

5.2 Chassis Management

The chassis management includes the following features:

- upgrading SwitchX firmware
- upgrading software
- monitoring of:
  - AC power to the PSUs
  - DC power out from the PSUs
  - board temperature
  - fan module status

  - chassis failures
- querying for switch serial numbers and their revisions , software version and SwitchX FW version

5.2.1 InfiniBand Subnet Manager

The InfiniBand Subnet Manager (SM) is a centralized entity running in the switch. It discovers and configures all the InfiniBand fabric devices to enable traffic flow between those devices. The SM applies network traffic related configurations such as QoS, routing, partitioning to the fabric devices.

You can view and configure the Subnet Parameters (SM) via the CLI/WebUI. Each subnet needs one subnet manager to discover, activate and manage the subnet.

Each network requires a Subnet Manager to be running in either the switch itself (switch based) or on one of the nodes which is connected to the fabric (host based).

No more than two subnet managers are recommended for any single fabric.

5.3 Fabric Diagnostics with UFM Diag

UFM Diag is a plug & play software for fee within MLNX-OS displaying and filtering all identified systems and nodes within the fabric.

UFM Diag includes a complete set of tools for fabric wide diagnostics to check node-node and node-switch connectivity and to verify routes within the fabric.

Advanced filtering allows creating filtering rules on a system wide basis, between nodes or port connections based on traffic patterns and user assigned system names (GUIDs).

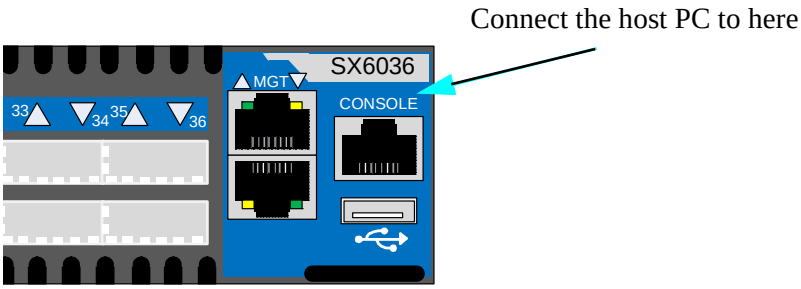
5.4 Configuring the Switch for the First Time

Unmanaged (Externally managed) switches do not get configured. The CONSOLE, Ethernet, and USB connectors are not found. Instead there is an I2C connector.

See the Installation Guide of the SX60XX switches, “Configuring the Switch for the First Time”. The port labelled CONSOLE must be connected to a local host PC. This must be used the first time the switch is connected. This must be done before any remote management is available.

Hook up the supplied harness cable (HAR00028) from the connector labelled CONSOLE to the DB9 connector of the local host PC.

Figure 28: Host Connection



5.4.1 Starting a Remote Connection to the Switch

There are two ways to access the management CPU:

- via the Ethernet connector for remote access:
  - SSH
  - Telnet
  - Web
  - SNMP
  - XML
- via KVM connections locally

For details on the SNMP commands and MIBs supported refer the MLNX-OS Software Command Reference Guide.

5.4.2 Upgrading Software

The new software and firmware update is available from the Mellanox Support website. Copy the update to a known location on a Remote server within the user's LAN.

Use the CLI or the GUI in order to perform Software upgrade. For further information please refer to the MLNX-OS user manual.

Be sure to read and follow all of the instructions regarding the updating of the software on your switch system.

5.5 Unmanaged (Externally Managed) Switch

The switch comes with the latest firmware burned on the board. All firmware updates should be done in-band. Go to the Mellanox Website and confirm that the firmware is the latest. If not,

reburn the latest firmware from the download site. New firmware versions will be posted on the Mellanox firmware download page:
http://www.mellanox.com => Support > Download Center.

You will need the Mellanox Firmware Tools package to update firmware for this switch. It can also be downloaded from:
http://www.mellanox.com => Support > InfiniBand Software and Drivers.

You will also need to download and unzip the firmware binary image. This is provided in the Mellanox Web site at: http://www.mellanox.com => Support > Download Center and go to the SwitchX Switch systems. Click in the Table for the firmware image that you need.

5.5.1 I2C Connector

The I2C connection provides access to Flash and EEPROMs. This connection allows access to the switch for updating firmware when in-band firmware updating is impossible.

The I2C connector should only be used when the firmware cannot be updated in-band.

The unmanaged switches are Plug and Play and all firmware updates should be done in-band. The I2C connection should only be used if the firmware image was corrupted to the point that the regular firmware tools cannot successfully reburn the correct image.

Note: The RJ45 to DB9 harness 22 in the box with the switch, is for use with the MTUSB-1 adapter. This is necessary only when updating firmware cannot be updated in-band.

This interface is for Debug and Troubleshooting only. This interface is for FAEs and advanced users only.

5.5.2 Current Firmware Revision For Externally Managed Switches

In order to obtain the Firmware version of the externally managed switch you need to run the following command from a host:

-vendstat -N <Switch LID>

5.5.3 Reprogramming the Switch Through The I2C Port

This interface is for Debug and Troubleshooting only. This interface is for FAEs and advanced users only.

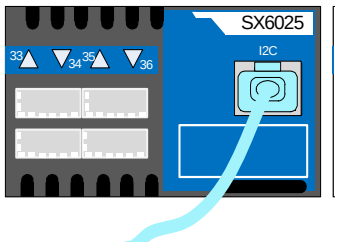
The I2C connector should only be used when the firmware cannot be updated in-band.

Use the MTUSB-1 adapter (available from Mellanox) to reprogram the switch firmware using a server or PC running MFT.

Figure 29: MTUSB-1 with Cables

The MTUSB adapter comes with three cables, but has only two connections for cables. One cable is an I2C cable with DB9 female connectors on both ends. One cable is a I2C cable with DB9 female connector to RJ45 male. Use the cable that matches your switch. The other is a USB cable with one type A host connection to be connected to the server or PC and a type B connection to be connected to the MTUSB adapter.

Figure 30: I2C Cable Connected to SX6025



With the switch connected to a computer through the MTUSB, it is now possible to reprogram the SPI Flash memory.

5.5.3.1 Instructions for Reprogramming Through the I2C Port

1. Make sure that:

- the MTUSB I2C cable is connected to the switch and USB cable is connected to a computer
- MFT is running on the computer
- "mtusb-1" mst device appears in "mst status"

2. Set the switch I2C switch to allow access by running:

```
> mlxi2c -d /dev/mst/mtusb-1 -s SX6025 p /SX
```

3. Run the burn command:

```
flint -d /dev/mst/mtusb-1 -i ./fw-SX-rel-7_4_0-Q_A1.bin -qq b
```

4. Power cycle the switch, by unplugging and re-plugging the power cord, to load the new firmware.

5.5.4 How to Get Mellanox Firmware Tools (MFT)

Mellanox Firmware Tools (MFT) and documentation are available for download via http://www.mellanox.com > Downloads > Firmware Tools.

The MFT kit includes:

- mlxburn
- flint
- spark
- debug utilities

See “Related Documentation” on page 7.

6 Troubleshooting

As soon as a switch is plugged in make sure that the green power LEDs on the PSUs are on.

Status LED and or Status Health LED

If either of these two LEDs is **red** unplug the switch and call your Mellanox representative.

Power supply unit:

If the LED on the PSU is not lit or is red, check that the power cable is plugged into a working outlet.

1. Check that the power cable has a voltage within the range of 100 - 240 volts AC.
2. Check that the air flow direction of the PSUs are consistent with the Fan module air flow.
3. Remove and reinstall the power cable.
4. Remove and reinstall the PSU.

The power LED for the switch shuts off:

1. Check that the there is adequate ventilation. Are the fan LEDs showing that the fans are all up and running?
2. Make sure that there is nothing blocking the front or rear of the chassis and that the fan modules and ventilation holes are not blocked (especially dust over the holes).
3. If you find dust blocking the holes it is recommended to clean the fan unit and remove the dust from the front and rear panels of the switch using a vacuum cleaner.

The green power LED for the fans does not come on:

1. Check that the Power LEDs are on.
2. Remove and reinstall the fan unit. Make sure the mating connector of the new unit is free of any dirt and/or obstacles. See Section 4.6.6, “Extracting and Inserting the Fan Unit,” on page 39.

Caution: Do not run the switch if the System Status LED for the Fans is Yellow!

The link LED for the connector does not come on:

1. Check that both ends of the cable are connected.
2. Check that the locks on the ends are secured.
3. Make sure that the latest firmware version is installed on both the HCA and the switch.
4. If media adapters are used, check that the all connections are good, tight, and secure.

The activity LED does not come on:

Check that the Subnet Manager has been started.

The switch is off:

1. Unplug the switch.
2. Wait 5 minutes.
3. Plug in the switch.
4. If the switch does not come on, check the power supplies.
5. If the switch comes on, Use the MLNX-OS management CLI or Web GUI to determine the cause of the Shutdown.
6. Check the temperature.
7. Check the Fan status.

The switch is not working and unresponsive:

1. Reset the switch.

If resetting the switch does not work:

1. Unplug the switch.
2. Wait 5 minutes.
3. Plug in the switch.
4. If the switch does not come on, check the power supplies.
5. If the switch comes on, use the MLNX-OS management CLI or Web GUI to determine the cause of the shutdown.

The last software update did not succeed:

1. Connect the RS232 connector (CONSOLE) to a laptop.
2. Push the reset button on the switch or management module.
3. You will have ~ 5 seconds to stop the U-Boot by pressing Control-B.
4. Choose the image to upload. Only use image 1 or image 2.

```
U-Boot 2009.01-mlnx1.4 (May 12 2010 - 14:08:15)


CPU:   AMCC PowerPC 460EX Rev. A at 1000 MHz (PLB=200, OPB=100,
       EBC=100 MHz)
       Security/Kasumi support
       Bootstrap Option H - Boot ROM Location I2C (Addr 0x52)
       Internal PCI arbiter disabled
       32 kB I-Cache 32 kB D-Cache
Board: Mellanox PPC460EX Board
FDEF:  No
I2C:   ready
```

```
DRAM:   2 GB (ECC enabled, 400 MHz, CL3)
FLASH: 16 MB
NAND:  1024 MiB
PCI:   Bus Dev VenId DevId Class Int
PCIE0: link is not up.
PCIE1: successfully set as root-complex
        01  00  15b3  bd34  0c06  00
Net:   ppc_4xx_eth0, ppc_4xx_eth1
Hit Ctrl+B to stop autoboot:  0


Mellanox MLNX-OS


Boot Menu:
  1. EFM_PPC_M460EX EFM_1.1.1000 2010-06-24 16:32:03 ppc
  2. EFM_PPC_M460EX EFM_1.1.1200  2010-06-25  18 :00:03 ppc
  3. U-Boot prompt
  Choice:
```

5. Select the image to boot.

Appendix A: Specification

Table 11 - SX6025 Specification Data

Physical		Power and Environmental	
Size:		Input Voltage:	100 - 240 VAC 50-60Hz
SX6025-B (short)	1.716” (1U) H x 16.8” W x16.8” D 43.6mm X 427.8mm X 428.9mm	Power Consumption:	PS unit fan is always at 70%
SX6025-S (Standard)	1.716” (1U) H x 16.8” W x24.75” D 43.6mm X 427.8mm X 628.9 mm	Typ@Typ :	
Weight:		FDR	
Short:	6.98kg 1 PSU 7.73kg 2 PSUs	Active Cables: Passive cables:	194W 112W
Standard:	7.92kg 1 PSU 8.67kg 2 PSUs	QDR/FDR10 Active Cables: Passive cables:	 172W 91W
Center of Gravity:	As measured from the Connector side, left side bottom corner.	Max@Max:	
Short :		FDR	
1PSU	21.6mm X 193mm X 209.8mm	Active Cables:	221W
2PSUs	21.6mm X 214mm X 218.8mm	Passive cables:	116W
Long :		QDR/FDR10	
1PSU	21.6mm X 201mm X 337mm	Active Cables:	211W
2PSUs	21.6mm X 214mm X 348mm	Passive cables:	106W
Mounting:	19” Rack mount	QSFP:	MAX 2W TYP: 1.5W
Air flow:	62CFM	Temperature:	0° to 45° Celsius
Heat dissipation:	798 BTUs/hr	Humidity:	5% - 95% non-condensing
SerDes Speeds:	10, 20, 40, or 56 Gb/s per port		
Connector Types:	QSFP+		

Protocol Support		Regulatory Compliance	
InfiniBand:	Auto-Negotiation of (56Gb/s,40Gb/s, 20Gb/s, 10Gb/s)	Safety:	US/Canada: cTUVus EU: IEC60950 International: CB Russia : GOST-R Argentina : S-mark China: CCC for power supply Korea : KN22:2209; KN24:2009
QoS:	8 InfiniBand Virtual Lanes for all ports		
Management:	Baseboard, Performance, and Device management Agents for full InfiniBand In-Band Management		
Data Rate:	FDR, FDR10, QDR, DDR, SDR	EMC (Emissions):	USA: FCC, Class A Canada: ICES, Class A EU: EN55022, Class A EU: EN55024, Class A EU: EN61000-3-2, Class A EU: EN61000-3-3, Class A Japan: VCCI, Class A Australia: C-Tick
		Environmental:	EU: IEC 60068-2-64: Random Vibration EU: IEC 60068-2-29: Shocks, Type I / II EU: IEC 60068-2-32: Fall Test
		Acoustic:	ISO 7779 ETS 300 753
Scalability and Performance		**Reliability, Availability and Serviceability Features**	
Switching Performance:	Simultaneous wire-speed any port to any port	Hot-Swappable:	Fan Module
		1+1 Redundant:	Power Supplies
Switching Capacity:	2.016 Tb/s for 36 ports FDR 1.65 Tb/s for 36 ports FDR 10 1.44 Tb/s for 36 ports QDR 720 Gb/s for 36 ports DDR		

Table 12 - SX6036 Specification Data

Physical		Power and Environmental	
Size:		Input Voltage:	100 - 240 VAC 50-60Hz
SX6036-B (short)	1.716” (1U) H x 16.8” W x16.8” D 43.6mm X 427.8mm X 428.9mm	Management CPU:	PowerPC 460EXr PS unit fan is always at 70%
SX6036-S (Standard)	1.716” (1U) H x 16.8” W x24.75” D 43.6mm X 427.8mm X 628.9 mm	Power Consumption:	
Weight:		Typ@Typ :	
Short:	7.08kg 1 PSU 7.82kg 2 PSUs	FDR Active Cables:	 207W
Standard:	8.02kg 1 PSU 8.76kg 2 PSUs	Passive cables: QDR/FDR10	126W
		Active Cables:	186W
Center of Gravity:	As measured from the Connector side, left side bottom corner.	Passive cables:	104W
Short :		Max@Max:	
1PSU	21.6mm X 193mm X 209.8mm	FDR	
2PSUs	21.6mm X 214mm X 218.8mm	Active Cables:	234W
Long :		Passive cables:	129W
1PSU	21.6mm X 201mm X 337mm	QDR/FDR10	
2PSUs	21.6mm X 214mm X 348mm	Active Cables:	224W
		Passive cables:	119W
Mounting:	19” Rack mount		
		QSFP:	MAX 2W TYP: 1.5W
Airflow:	62CFM		
Heat dissipation:	798 BTUs/hr	Temperature:	0° to 45° Celsius
		Humidity:	5% - 95% non-condensing
SerDes Speeds:	10, 20, 40, or 56 Gb/s per port		
Connector Types:	QSFP+		

Protocol Support		Regulatory Compliance	
InfiniBand:	Auto-Negotiation of (56Gb/s,40Gb/s, 20Gb/s, 10Gb/s)	Safety:	US/Canada: cTUVus EU: IEC60950 International: CB Russia : GOST-R Argentina : S-mark China: CCC for power supply Korea : KN22:2209; KN24:2009
QoS:	8 InfiniBand Virtual Lanes for all ports		
Management:	Baseboard, Performance, and Device management Agents for full InfiniBand In-Band Management		
Data Rate:	FDR, FDR10, QDR, DDR, SDR	EMC (Emissions):	USA: FCC, Class A Canada: ICES, Class A EU: EN55022, Class A EU: EN55024, Class A EU: EN61000-3-2, Class A EU: EN61000-3-3, Class A Japan: VCCI, Class A Australia: C-Tick
		Environmental:	EU: IEC 60068-2-64: Random Vibration EU: IEC 60068-2-29: Shocks, Type I / II EU: IEC 60068-2-32: Fall Test
		Acoustic:	ISO 7779 ETS 300 753
Scalability and Performance		**Reliability, Availability and Serviceability Features**	
Switching Performance:	Simultaneous wire-speed any port to any port	Hot-Swappable:	Fan Module
		1+1 Redundant:	Power Supplies
Switching Capacity:	2.016 Tb/s for 36 ports FDR 1.65 Tb/s for 36 ports FDR 10 1.44 Tb/s for 36 ports QDR 720 Gb/s for 36 ports DDR		

A.1 EMC Certification Statements

See the Regulatory and Compliance Guide.

A.1.1 FCC Statements (USA)

Class A Statements:

§ 15.19(a)(4)

This device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

§ 15.21

Statement

Warning! Changes or modifications to this equipment not expressly approved by the party responsible for compliance (Mellanox Technologies) could void the user's authority to operate the equipment.

§15.105(a)

Statement

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

A.1.2 EN Statements (Europe)

EN55022 Class A Statement:

Warning

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be

A.1.3 ICES Statements (Canada)

Class A Statement:

"This Class A digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada."

A.2 VCCI Statements (Japan)

Class A Statement:

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

A.2.1 (Translation - "This is a Class A product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio interference may occur, in which case the user may be required to take corrective actions.")

A.3 MIC Certification (Korea)

Korea's "Regulation for Certification of Information and Communication Equipment," requires EMC testing and certification for many electronic products. Korean EMC certifications are issued by Radio Research Laboratory (RRL), which is organized under the Ministry of Information and Communications (MIC). EMC testing includes electromagnetic emissions (EMI) and susceptibility (EMS). Certified equipment is labeled with the MIC mark and certification number.

English Translation

Device	User's information
A급 기기 (업무용 방송통신기기)	이 기기는 업무용(A급)으로 전자파적합등록을 한 기기이오니 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.
CLASS A device (commercial broadcasting and communication equipment)	This device has been approved by EMC registration. Distributors or users pay attention to this point . This device is usually aimed to be used in other area except at home .

- Remark

Class A device: operated in a commercial area.

Translation:

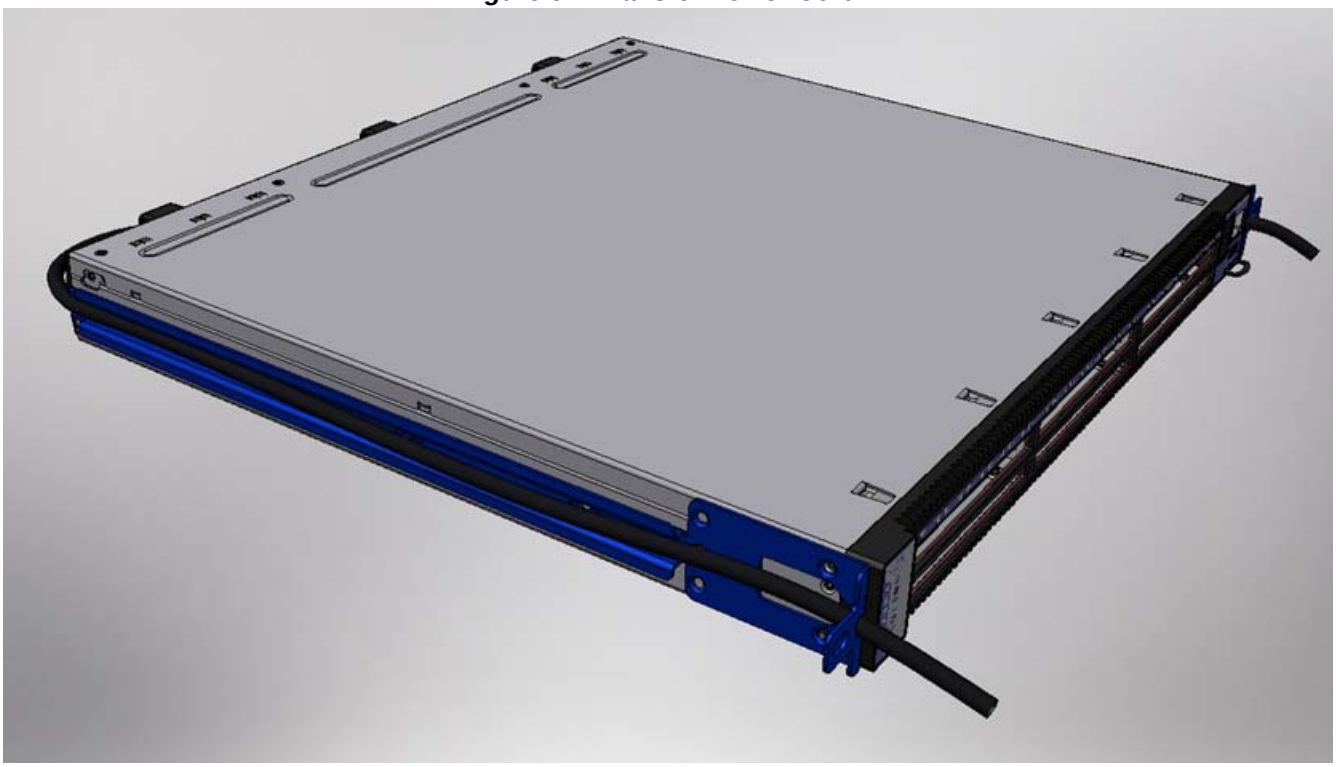
Class A Device This device is registered for EMC requirements for industrial use. The seller or buyer should be aware of this. If this type was sold or purchased by mistake, it should be replaced with a residential-use type.

Appendix B: Transferring the Power Cord

To use the rail kit to transfer the power cord from the connector side to the power side follow these directions. Do you want to install power cords on both sides of the switch or only one side? For each power cord you want to transfer:

1. Once you have decided which side of the switch will be next to the vertical support?
2. Make sure that you place the cord so that the correct end of the cord will be at the power side of the switch. This will depend on which of the four mounting options you choose.

Figure 31: Transfer Power Cord

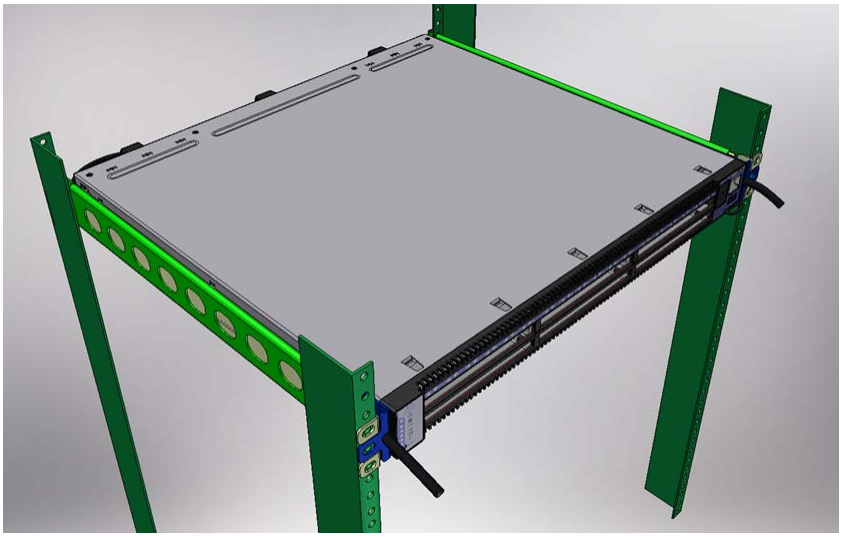


3. Put the power cord in the switch slide channel.
4. Push the cord end through the hole in the switch slide. Leave ~ 7” of cord hanging out from the hole.
5. Screw the switch slides to the switch. Make sure to use two cord clamps per switch slide. These will be needed to hold the cord during the switch installation process.

Figure 32: Install the Power Cord Clip

6. Push the power cord into the cord clamps.

Figure 33: Transfer Power Cord Finished



7. Return to step 4 on page 33 and continue the installation.

Appendix C: QSFP Interface

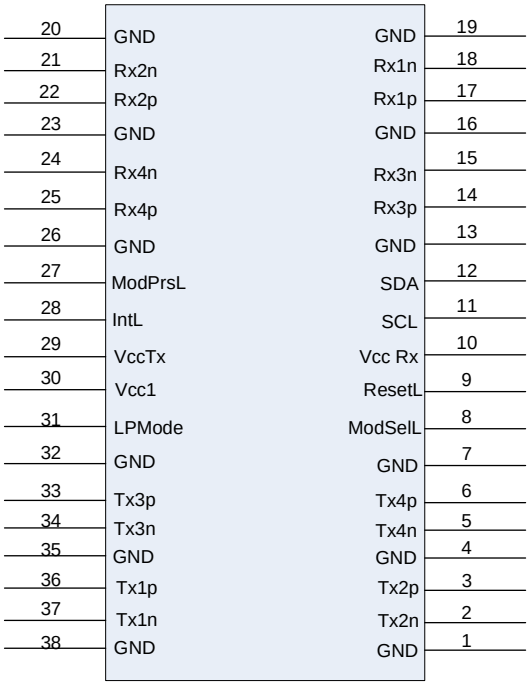
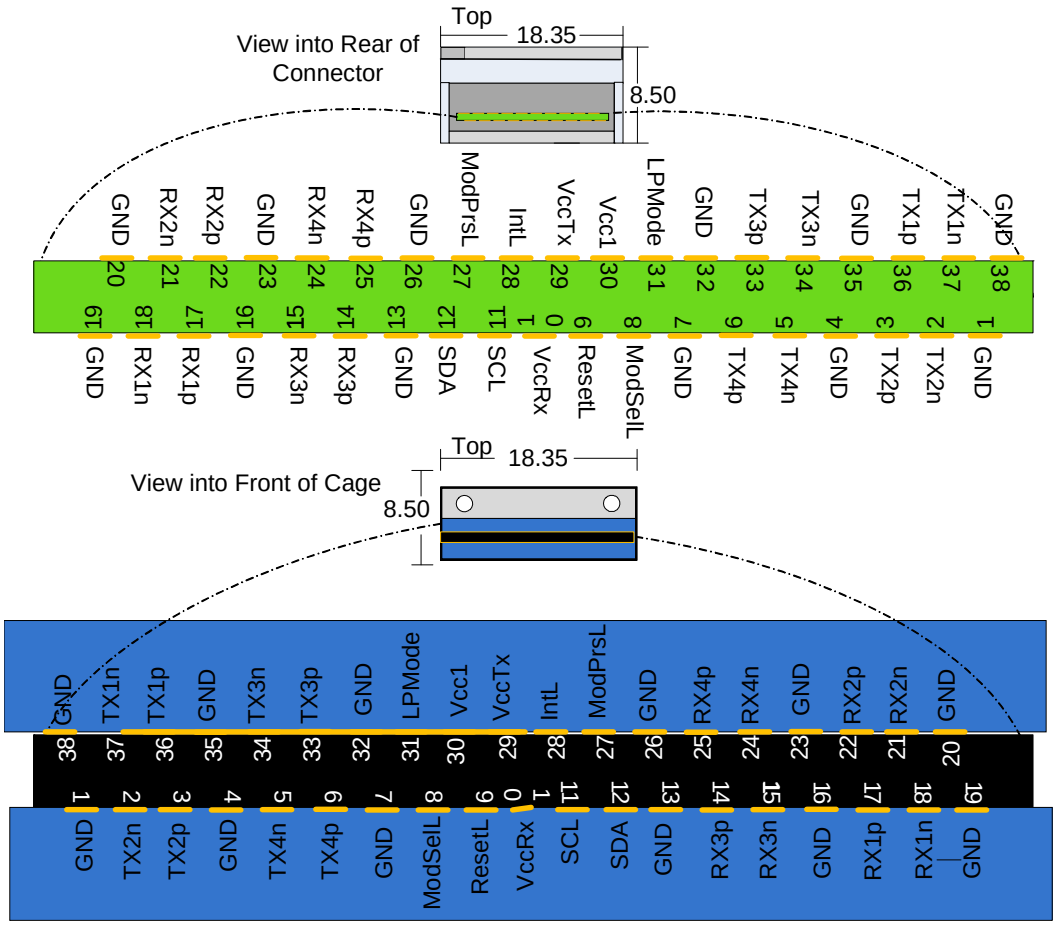


Table 13 - QSFP Connector Pinout

Connector Pin Number	Connector Pin Name	Signal Description
1	GND	Ground
2	Tx2n	Transmitter Inverted Data Input
3	Tx2p	Transmitter Non-Inverted Data Input
4	GND	Ground
5	Tx4n	Transmitter Inverted Data Input
6	Tx4p	Transmitter Non-Inverted Data Input
7	GND	Ground
8	ModSelL	Module Select
9	ResetL	Module Reset
10	Vcc Rx	+3.3 V Power supply receiver
11	SCL	2-wire serial interface clock
12	SDA	2-wire serial interface data
13	GND	Ground
14	Rx3p	Receiver Non-Inverted Data Output
15	Rx3n	Receiver Inverted Data Output
16	GND	Ground
17	Rx1p	Receiver Non-Inverted Data Output
18	Rx1n	Receiver Inverted Data Output
19	GND	Ground
20	GND	Ground
21	Rx2n	Receiver Inverted Data Output 3
22	Rx2p	Receiver Non-Inverted Data Output 3
23	GND	Ground
24	Rx4n	Receiver Inverted Data Output 3
25	Rx4p	Receiver Non-Inverted Data Output 3
26	GND	Ground
27	ModPrsL	Module Present
28	IntL	Interrupt
29	Vcc Tx	+3.3 V Power supply transmitter
30	Vcc 1	+3.3 V Power Supply
31	LPMode	Low Power Mode
32	GND	Ground
33	Tx3p	Transmitter Non-Inverted Data Input
34	Tx3n	Transmitter Inverted Data Input
35	GND	Ground
36	Tx1p	Transmitter Non-Inverted Data Input
37	Tx1n	Transmitter Inverted Data Input
38	GND	Ground

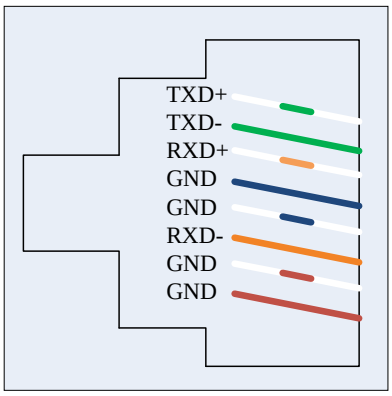

Top
View into Rear of Connector
18.35
8.50
GND RX2n RX2p GND RX4n RX4p GND ModPrsL IntL VccTx Vcc1 LPMode GND TX3p TX3n GND TX1p TX1n GND
20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
GND RX1n RX1p GND RX3n RX3p GND SDA SCL VccRx ResetL ModSelL GND TX4p TX4n GND TX2p TX2n GND
Top
View into Front of Cage
18.35
8.50
GND TX1n TX1p GND TX3n TX3p GND LPMode Vcc1 VccTx IntL ModPrsL GND RX4p RX4n GND RX2p RX2n GND
38 37 36 35 34 33 32 31 30 29 28 27 26 25 24 23 22 21 20
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
GND TX2n TX2p GND TX4n TX4p GND ModSelL ResetL VccRx SCL SDA GND RX3p RX3n GND RX1p RX1n GND

Appendix D: RJ45 CONSOLE and Ethernet Interfaces

The RJ45 CONSOLE and Ethernet interfaces uses the EIA 568A standard wiring color coding.

CONSOLE

J34



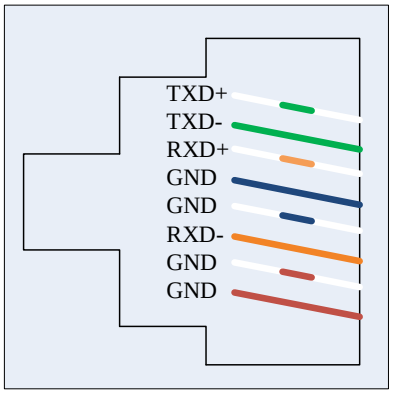
Looking into the Socket

Table 14 - RJ45 Pinout

Connection	Signal	Pin#	Color
TXD+	RJ45_RTS#	1	G/W
TXD-	RJ45_DTR#	2	G
RXD+	RJ45_TXD	3	O/W
GND	GND	4	Bl
GND	GND	5	Bl/W
RXD-	RJ45_RXD	6	O
GND	GND	7	Br/w
GND	GND	8	Br

I^2C

J34



Looking into the Socket

Appendix E: Replacement Parts Ordering Numbers

Table 15 - Replacement Parts Ordering Numbers

Part Description	OPN
I2C DB9 or RJ45 to USB Adapter	MTUSB-1
Fan module with power supply side to connector side air flow	MSX60-FF
Fan module with connector side to power supply side air flow	MSX60-FR
300W Power Supply w/ Power Supply Side to Connector side air flow	MSX60-PF
300W Power Supply w/ Connector side to Power Supply side air flow	MSX60-PR
Power cord Type C13-C14	ACC000251
Power cord Type B for USA, Canada, Mexico, Taiwan	ACC000204
Power cord Type H for Israel	ACC000205
Power cord Type E/F for Sweden, France, Germany, Netherlands, Russia	ACC000207
Power cord Type G for UK	ACC000208
Power cord Type D for India	ACC000209
Power cord Type I for China	ACC000210
Power cord Type J for Switzerland	ACC000211
Power cord Type B for Japan,	ACC000212
Power cord Type I for Australia	ACC000213
Installation Kit for short switches in racks 40-60 cm deep	MSX60-BKIT
Installation Kit for short or standard switches in racks 60-80 cm deep	MSX60-SKIT

Appendix F: Avertissements de sécurité d'installation (French)

1. **Instructions d'installation**

Lisez toutes les instructions d'installation avant de brancher le matériel à la source d'alimentation électrique.

2. **Température excessive**

Ce matériel ne doit pas fonctionner dans une zone avec une température ambiante dépassant le maximum recommandé de 45°C (113°F). En outre, pour garantir un bon écoulement de l'air, laissez au moins 8 cm (3 pouces) d'espace libre autour des ouvertures de ventilation.

3. **Empilage du châssis**

Le châssis ne doit pas être empilé sur un autre matériel. Si le châssis tombe, il peut provoquer des blessures corporelles et des dégradations de biens.

4. **Connection d'Alimentation electrique excedentaire -dangers électriques**

Ce produit comporte un couvercle transparent sur l'espace pour l'alimentation électrique redondante.
Ne pas faire fonctionner le produit si le couvercle transparent n'est pas solidement fixé ou s'il est enlevé.

5. **Orages – dangers électriques**

Pendant un orage, il ne faut pas utiliser le matériel et il ne faut pas brancher ou débrancher les câbles.

6. **Branchement/débranchement des câbles en cuivre**

Les câbles en cuivre sont lourds et ne sont pas flexibles, il faut donc faire très attention en les branchant et en les débranchant des connecteurs. Consultez le fabricant des câbles pour connaître les mises en garde et les instructions spéciales.

7. **Montage et entretien sur baie**

Lorsque ce produit est monté ou entretenu sur baie, il faut prendre des précautions spéciales pour s'assurer que le système reste stable. En général, il faut remplir la baie avec du matériel de bas en haut.

8. Installation du matériel

Ce matériel ne doit être installé, remplacé ou entretenu que par du personnel formé et qualifié.

9. Elimination du matériel

L’élimination de ce matériel doit s’effectuer dans le respect de toutes les législations et réglementations nationales en vigueur.

10. Codes électriques locaux et nationaux

Ce matériel doit être installé dans le respect des codes électriques locaux et nationaux.

Appendix G: Installation - Sicherheitshinweise (German)

1. **Installationsanleitungen**

Lesen Sie alle Installationsanleitungen, bevor Sie das Gerät an die Stromversorgung anschließen.

2. **Übertemperatur**

Dieses Gerät sollte nicht in einem Bereich mit einer Umgebungstemperatur über der maximal empfohlenen Temperatur von 45°C (113°F) betrieben werden. Außerdem sollten mindestens 8 cm (3 in.) Freiraum um die Belüftungsöffnungen sein, um einen einwandfreien Luftstrom zu gewährleisten.

3. **Stapeln des Chassis**

Das Chassis sollte nicht auf andere Geräte gestapelt werden. Wenn das Chassis herunterfällt, kann es zu Verletzungen und Beschädigungen an Geräten führen.

4. **Redundanter Stromversorgungsanschluss - Elektrische Gefahr**

Dieses Produkt verfügt über eine Abdeckung über dem Bereich für die redundante Stromversorgung. Betreiben Sie das Produkt nicht, wenn diese Abdeckung nicht sicher festsitzt oder entfernt wurde.

5. **Bei Gewitter - Elektrische Gefahr**

Arbeiten Sie während eines Gewitters und Blitzschlag nicht am Gerät, schließen Sie keine Kabel an oder ab.

6. **Anschließen/Trennen von -Kupferkabel**

Kupferkabel sind schwer und nicht flexible. Deshalb müssen sie vorsichtig an die Anschlüsse angebracht bzw. davon getrennt werden. Lesen Sie die speziellen Warnungen und Anleitungen des Kabelherstellers.

7. **Rack-Montage und Wartung**

Wenn dieses Produkt in einem Rack montiert oder gewartet wird, sind besondere Vorsichtsmaßnahmen zu ergreifen, um die Stabilität des Systems zu gewährleisten. Im Allgemeinen sollten Sie das Gestell von unten nach oben mit Geräten füllen.

8. Geräteinstallation

Diese Gerät sollte nur von geschultem und qualifiziertem Personal installiert, ausgetauscht oder gewartet werden.

9. Geräteentsorgung

Die Entsorgung dieses Geräts sollte unter Beachtung aller nationalen Gesetze Bestimmungen erfolgen.

10. Regionale und nationale elektrische Bestimmungen

Dieses Gerät sollte unter Beachtung der regionalen und nationalen elektrischen Bestimmungen installiert werden.

Appendix H: Advertencias de seguridad para la instalación (Spanish)

1. **Instrucciones de instalación**

Antes de conectar el equipo a la fuente de alimentación, leer todas las instrucciones de instalación.

2. **Instalación en un lugar con acceso restringido.**

Esta unidad ha sido ideada para instalar en lugares de acceso restringido.

3. **Sobrecalentamiento**

No se debe utilizar el equipo en un área con una temperatura ambiente superior a la máxima recomendada: 45°C. Además, para garantizar una circulación de aire adecuada, se debe dejar como mínimo un espacio de 8 cm (3 pulgadas) alrededor de las aberturas de ventilación.

4. **Apilamiento del chasis**

Los chasis no se deben apilar sobre otros equipos. La caída del chasis podría causar lesiones corporales, así como daños al equipo.

5. **Conexión de fuente de alimentación redundante: peligro de descarga eléctrica**

Este producto incluye una fuente de alimentación redundante o, en su lugar, una vacía. Si se dispone de una fuente de alimentación vacía, no utilizar el producto si su tapa está quitada o no está bien cerrada.

6. **Cuando hay rayos: peligro de descarga eléctrica**

No utilizar el equipo ni conectar o desconectar cables durante períodos de actividad de rayos.

7. **Montaje y mantenimiento de bastidores**

Al instalar o realizar el mantenimiento de este aparato en un bastidor, es preciso adoptar precauciones especiales para garantizar que el sistema se mantenga estable. En general, en un bastidor, los equipos se deben instalar comenzando desde abajo hacia arriba.

8. Instalación de equipos

La instalación, el reemplazo y el mantenimiento de este equipo estarán a cargo únicamente de personal capacitado y competente.

9. Asegurar confinamientos adecuados

El fabricante del producto final o el usuario final deberán suministrar un confinamiento adecuado para componentes eléctricos y mecánicos y contra incendio.

10. Eliminación de equipos

La eliminación definitiva de este equipo se debe efectuar conforme a todas las leyes y reglamentaciones nacionales.

11. Códigos eléctricos locales y nacionales

Este equipo se debe instalar conforme a los códigos eléctricos locales y nacionales.

12. Cable de alimentación homologado por UL y con certificación CSA Fuga > 3,5 mA

En conexiones de América del Norte, seleccionar un cable de alimentación homologado por UL y con certificación CSA de tres conductores, [16 AWG], terminado en un enchufe moldeado con capuchón de 125 voltios nominal, [13 A], con una longitud mínima de 1,5 metros, pero no más de 4,5 metros.

En conexiones europeas, seleccionar un cable de alimentación armonizado internacionalmente y marcado "<HAR>", de tres conductores, hilo de 1,0 mm2 como mínimo, 300 voltios nominal, con cobertura protectora aislante de PVC. El cable debe tener un enchufe moldeado con capuchón de 250 voltios nominal, 10 A.

ADVERTENCIA: Alta corriente de fuga. Es esencial efectuar la conexión a tierra antes de conectar la alimentación.

13. Añadir conexión a tierra

Antes de conectar el dispositivo a la línea de alimentación, los tornillos del terminal de la puesta a tierra de protección del dispositivo se deben conectar a la puesta a tierra de protección de la instalación del edificio.

(Información de conexión a tierra):

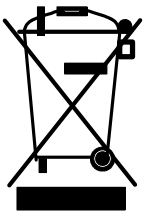
La instalación del edificio deberá prover un medio para la conexión con la puesta a tierra de protección y un técnico de servicio deberá conectar permanentemente el equipo a dicho medio de conexión.

Un TÉCNICO DE SERVICIO comprobará si la toma eléctrica de la que se suministrará corriente al equipo provee una conexión con la puesta a tierra de protección del edificio. De no ser así, el TÉCNICO DE SERVICIO se encargará de instalar un CONDUCTOR DE CONEXIÓN A TIERRA DE PROTECCIÓN, del terminal de puesta a tierra de protección separado al conductor de tierra de protección del edificio. El equipo se instalará en un área donde haya conexión equipotencial, como por ejemplo, un centro de telecomunicaciones o una sala de computadoras dedicada.

14. Códigos de instalación

Este dispositivo se debe instalar conforme a la versión más reciente de los códigos eléctricos nacionales del país en cuestión. En América del Norte, el equipo se debe instalar de acuerdo con las disposiciones vigentes del Código Eléctrico Nacional de los EE.UU. y del Código Eléctrico de Canadá.

15. Directiva sobre RAEE



Conforme a la Directiva 2002/96/CE sobre RAEE, todos los residuos de equipos eléctricos y electrónicos (EEE) se deben recolectar por separado y no se deben eliminar junto con residuos domésticos.

Al deshacerse de este producto y de todas sus partes, hágalo de una manera responsable y respetuosa con el medio ambiente.